

A1 In Fig. 4, however, a cross-sectional view of a microelectronic topography suitable for use in an embodiment is shown as configured before performing step 110. Microelectronic topography 200 is shown with a dielectric layer 202 arranged above a lower portion 201 of the microelectronic topography. Microelectronic topography lower portion 201 may include a substrate and any layers and materials formed above the substrate from which microelectronic products (e.g., semiconductor devices) may be produced. Preferably, microelectronic topography lower portion 201 includes a semiconductor substrate, and more preferably a lightly doped, single-crystal silicon substrate. Active devices, such as MOS transistors, may be arranged upon and within the semiconductor substrate. The active devices may be isolated from each other using isolation structures. In an alternate embodiment, microelectronic topography lower portion 201 may include a substrate composed of a non-semiconducting material. Such non-semiconducting materials may include metals and ceramics.

Please replace pg. 15, lines 21-26, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

A2 Referring back to Fig. 1, microelectronic topography 200 is preferably transferred to a wetting layer deposition chamber (step 120) after pre-cleaning process 110 is complete. Transfer of the microelectronic topography between the pre-cleaning chamber and the wetting layer deposition chamber, and between two chambers in general in an embodiment, preferably is performed under high vacuum (e.g.,  $10^{-9}$  torr). The wetting layer may then be ion metal plasma deposited into the cavity (step 130).

Please replace pg. 16, line 26 - pg. 17, line 3, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

A3 Fig. 2 presents a schematic view of a wetting layer deposition chamber in which ion metal plasma deposition 130 may be performed to deposit wetting layer 212. Wetting layer deposition chamber 300 may include a target 302, a pedestal 306, and an ionizing element 320. Microelectronic topography 200 may be placed upon pedestal 306 during deposition of a wetting layer using chamber 300. Wetting layer deposition chamber 300 is preferably

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configured to perform ion metal plasma deposition processes. Deposition chamber 300 may be obtained and/or configured as a chamber in a multi-chamber system such as the Endura PVD 5500, available from Applied Materials (Santa Clara, CA).

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Please replace pg. 17, lines 18-26, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

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Ionizing element 320 is preferably arranged between target 302 and pedestal 306, and is preferably configured to ionize at least a portion of the metal atoms sputtered from target 302 before the metal ions reach pedestal 306. More preferably, ionizing element 320 includes induction coil 310 configured around wetting layer deposition chamber 300 and mounted near or on sidewalls 311 of the chamber. The induction coil may turn around the chamber any number of times. An induction coil power supply 318 may be operably coupled to the induction coil for applying power to the coil. Induction coil power supply 318 may supply RF power to the induction coil during processing. Induction coil power supply 318 may include a matching network.

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Please replace pg. 18, line 23 - pg. 19, line 6, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

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In an embodiment, once microelectronic topography 200 is transferred to wetting layer deposition chamber 300, it may be positioned above, and preferably upon, pedestal 306. Once the topography is secured on the pedestal, a sputtering gas may be introduced into the chamber from sputtering gas supply 314. The sputtering gas is preferably an inert gas such as argon. The flow rate of the sputtering gas into wetting layer deposition chamber 300 may vary depending on processing goals. The flow rate of the sputtering gas into wetting layer deposition chamber 300 is preferably set at about 3.25-6.75 standard cubic centimeters per second (sccm), more preferably about 4.5-5.5 sccm, and optimally about 5 sccm. A gas may also be flowed from backside gas supply 324 onto the backside of microelectronic topography 200. The backside gas used is preferably argon. The backside gas flow rate may be about 15 sccm, but may be altered subject to processing considerations.

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The pumping system is preferably actuated to evacuate gases and byproducts from the chamber to maintain a desired level of vacuum with the chamber.

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Please replace pg. 20, lines 14-20, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

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Another problem addressed by the present process is the build-up of deposited metal on tapered portions 210 of the cavity sidewalls. During deposition, deposited metal can accumulate on the tapered portions of the cavity sidewalls to such an extent that the metal overhangs (or shadows) lower portions of sidewalls 208. When this happens, deposited metal cannot reach the shadowed sidewall portions, and thus these areas may not receive sufficient coverage. This is particularly a problem for the lower sidewall portions, which are perhaps the portions most likely to be shadowed.

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Please replace pg. 22, lines 1-12, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

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After a wetting layer 212 of the desired thickness has been formed, deposition of the wetting layer may be terminated. Referring back to Fig. 1, microelectronic topography 200 may then be transferred from wetting layer deposition chamber 300 into a bulk layer deposition chamber (step 140). Again, transfer of the microelectronic topography between chambers is preferably done under high vacuum. The microelectronic topography is preferably immediately transferred to the bulk metal deposition chamber after deposition of the wetting layer is complete. In any case, bulk metal layer deposition 150 is preferably the first metal deposition process performed on the microelectronic topography after depositing the wetting layer. That is, while other processing steps may be performed in between deposition of the wetting layer and the deposition of the bulk metal layer, e.g. cleaning processes, there are preferably no intervening processes between steps 130 and 150 in which a metal layer is deposited.

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Please replace pg. 22, lines 14-25, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

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A8  
Once in the bulk metal layer deposition chamber, a bulk metal layer may be sputter deposited within the cavity for filling the cavity. The bulk metal layer is preferably deposited on upon the wetting layer. Deposition of the bulk layer is preferably performed in a single deposition chamber (the bulk metal layer deposition chamber) until the cavity is substantially filled. That is, deposition of the bulk metal layer is preferably undertaken until the level of metal within the lateral boundaries of the cavity is at least as high as the top of the cavity, even though there may be voids within the metal in the cavity. In addition, deposition of the bulk metal layer is not required to be performed continuously (e.g., deposition may be halted at some point), but it is preferred that the entire bulk metal layer be deposited in a single chamber. The bulk metal layer is may also be deposited above, and preferably upon, the upper surface of the wetting layer outside of the cavity.

Please replace pg. 23, lines 15-24, with the amended paragraph below. A "marked-up" version of each amendment is included in Attachment A.

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Fig. 7 presents a cross-sectional view of microelectronic topography 200 after cold sputter depositing the first portion of the bulk metal layer into the cavity. In a preferred embodiment, first portion 214 of the bulk metal layer may be deposited above, and more preferably directly upon, wetting layer 212 both within and outside of cavity 204. First portion 214 of the bulk metal layer is preferably deposited by cold sputter deposition such that immediately after being deposited, the first portion of the bulk metal layer is not configured to significantly reflow. That is, while it may be made to reflow subsequently, it is not configured or capable of reflowing immediately after being deposited. After being deposited, the first portion of the bulk metal layer preferably does not fill cavity 204.

Please replace pg. 25, lines 6-15, with the amended paragraph below. A "marked-up" version of each amendment is included in Attachment A.

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Target 402 is preferably attached to a target assembly 404 fixably coupled to a top wall 408 of chamber 400. Target 402 is preferably composed of a metal having the desired composition as the bulk metal layer to be deposited. Preferably, target 402 is primarily composed of aluminum or an aluminum alloy. Target assembly 404 preferably includes the

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structural and electric assembly related to target 402. Target assembly 404 may also include magnetizing elements and mechanisms for operating such magnetizing elements. A target power supply 416 may be operably coupled to target assembly 404 for applying power to target 402. Target power supply 416 is preferably configured to supply DC power to target 402 for ionizing and attracting sputtering gas atoms towards the target for sputtering metal off of the target during processing.

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Please replace pg. 26, lines 10-22, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

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In an embodiment, once microelectronic topography 200 is transferred to bulk metal layer chamber 400, it may be positioned above, and preferably upon, pedestal 406. Cold sputtering of first portion 214 of the bulk metal layer may then begin. Once topography 200 is secured on pedestal 406, a sputtering gas may be introduced into chamber 400 from sputtering gas supply 414. The sputtering gas is preferably an inert gas such as argon. The flow rate of the sputtering gas into bulk metal layer deposition chamber 400 may vary depending on processing goals. The flow rate of the sputtering gas into bulk metal layer deposition chamber 400 is preferably about 25-55 sccm, more preferably about 35-45 sccm, and optimally about 40 sccm. During cold sputtering of first portion 214 of the bulk layer, backside gas is preferably not supplied to the backside of microelectronic topography 200. The pumping system is preferably actuated to evacuate gases and byproducts from chamber 400 to maintain a desired level of vacuum with the chamber.

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Please replace pg. 28, lines 2-11, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

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It should be understood that hot sputtering may not begin in a technical sense (i.e., the deposited metal is still not configured to substantially reflow) until a short while after the actual process conditions are changed from those of hot sputtering to those of cold sputtering. It should be appreciated that regardless of the processing conditions used, the technical accuracy labels of the labels "hot" or "cold" sputtering may be determined by the behavior of a material, e.g., immediately after being deposited. As such, a portion of the

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material deposited during processing conditions that fall under the classification "hot sputtering" may actually be "cold" sputtered, and vice versa. Therefore, when referring to only the process conditions of deposition, the terms "hot sputtering" and "cold sputtering" are used merely for convenience.

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Please replace pg. 34, lines 3-10, with the amended paragraph below. A "marked-up" version of each amendment is included in **Attachment A**.

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A13

A method for fabricating a metallization structure is presented. The method preferably includes ion metal plasma depositing a wetting layer within a cavity defined in a dielectric layer. The wetting layer preferably includes titanium. The method preferably further includes sputter depositing a bulk metal layer within the cavity and upon the wetting layer. Sputter depositing of the bulk metal layer is preferably performed in a single deposition chamber at least until the cavity is substantially filled.

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#### In The Drawings:

Submitted herewith in separate paper is a Request for Approval of Drawing Changes. The Examiner's review and approval of changes to FIG. 2 is solicited. The changes are submitted for clarification and consistency with the Specification and as such do not present new matter.

#### In the Claims:

Please cancel claims 19 and 20 without prejudice or disclaimer as to the subject matter recited herein. Please replace claims 1, 3-5, 7-9, and 12-18 with the amended claims below. A "marked-up" version of each amendment is included in **Attachment A**.